

What is claimed is:

1 1. A field emission device (FED) comprising:
2 a substrate;
3 a cathode formed over the substrate;
4 micro-tips having nano-sized surface features, formed on the cathode;
5 a gate insulation layer with wells each of which a single micro-tip is located in,
6 the gate insulation layer formed over the substrate;
7 a gate electrode with gates aligned with the wells such that each of the micro-
8 tips is exposed through a corresponding gate, the gate electrode formed on the gate
9 insulation layer;
10 a focus gate insulation layer having openings each of which one or more gates
11 correspond to, the focus gate insulation layer formed on the gate electrode; and
12 a focus gate electrode with focus gates aligned with the openings of the focus
13 gate insulation layer, the focus gate electrode formed on the focus gate insulation
14 layer.

1 2. The field emission device of claim 1, wherein a resistor layer is formed
2 over or beneath the cathode, or a resistor layers is formed over and beneath the
3 cathode.